

EXHIBIT H



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Bates

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(54) **PROCESSING WITH COMPACT
ARITHMETIC PROCESSING ELEMENT**

(71) Applicant: **Singular Computing LLC**, Newton,
MA (US)

(72) Inventor: **Joseph Bates**, Newton, MA (US)

(73) Assignee: **SINGULAR COMPUTING LLC**,
Newton, MA (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

This patent is subject to a terminal dis-
claimer.

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Oct. 16, 2017, now Pat. No. 10,120,648, which is a
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CPC **G06F 7/483** (2013.01); **G06F 7/38**
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(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,493,048 A 1/1985 Kung
4,583,222 A 4/1986 Fossum
(Continued)

FOREIGN PATENT DOCUMENTS

EP 0632369 A1 1/1995
JP H0877282 A 3/1996

OTHER PUBLICATIONS

US 10,838,694 B2, 11/2020, Bates (withdrawn)

(Continued)

Primary Examiner — Michael D. Yaary

(74) *Attorney, Agent, or Firm* — Blueshift IP LLC;
Robert Plotkin

(57) **ABSTRACT**

Low precision computers can be efficient at finding possible
answers to search problems. However, sometimes the task
demands finding better answers than a single low precision
search. A computer system augments low precision comput-
ing with a small amount of high precision computing, to
improve search quality with little additional computing.

24 Claims, 11 Drawing Sheets

